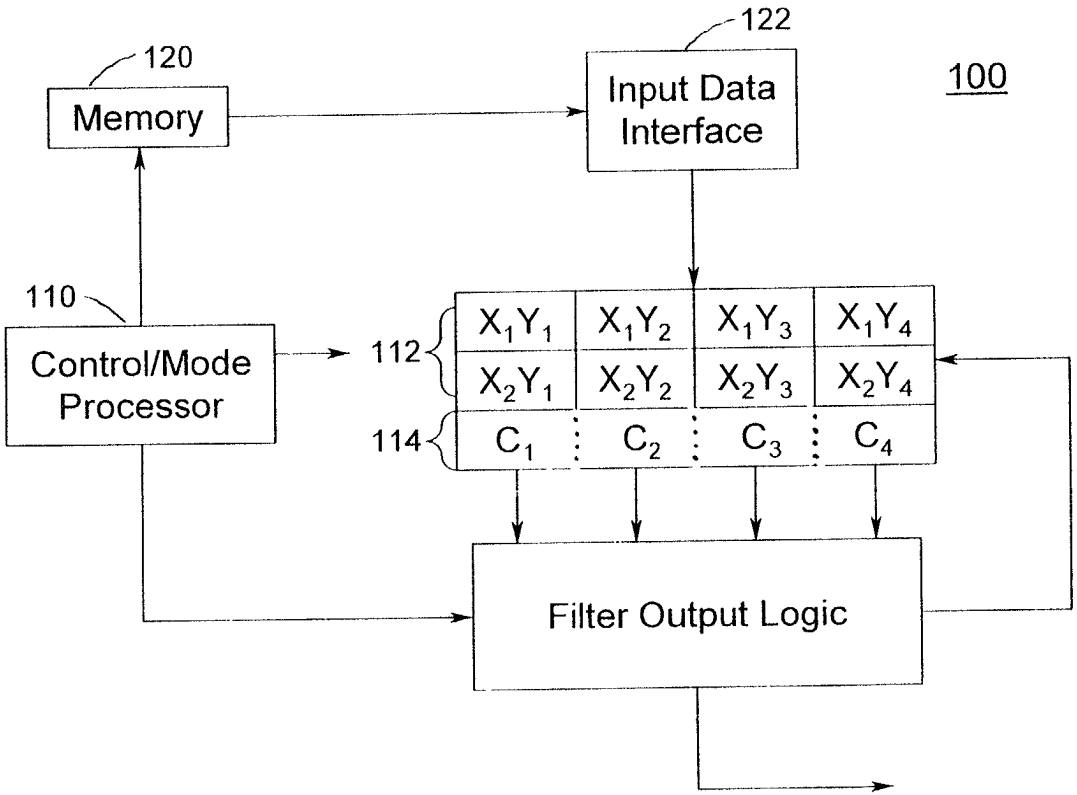


FIG. 1

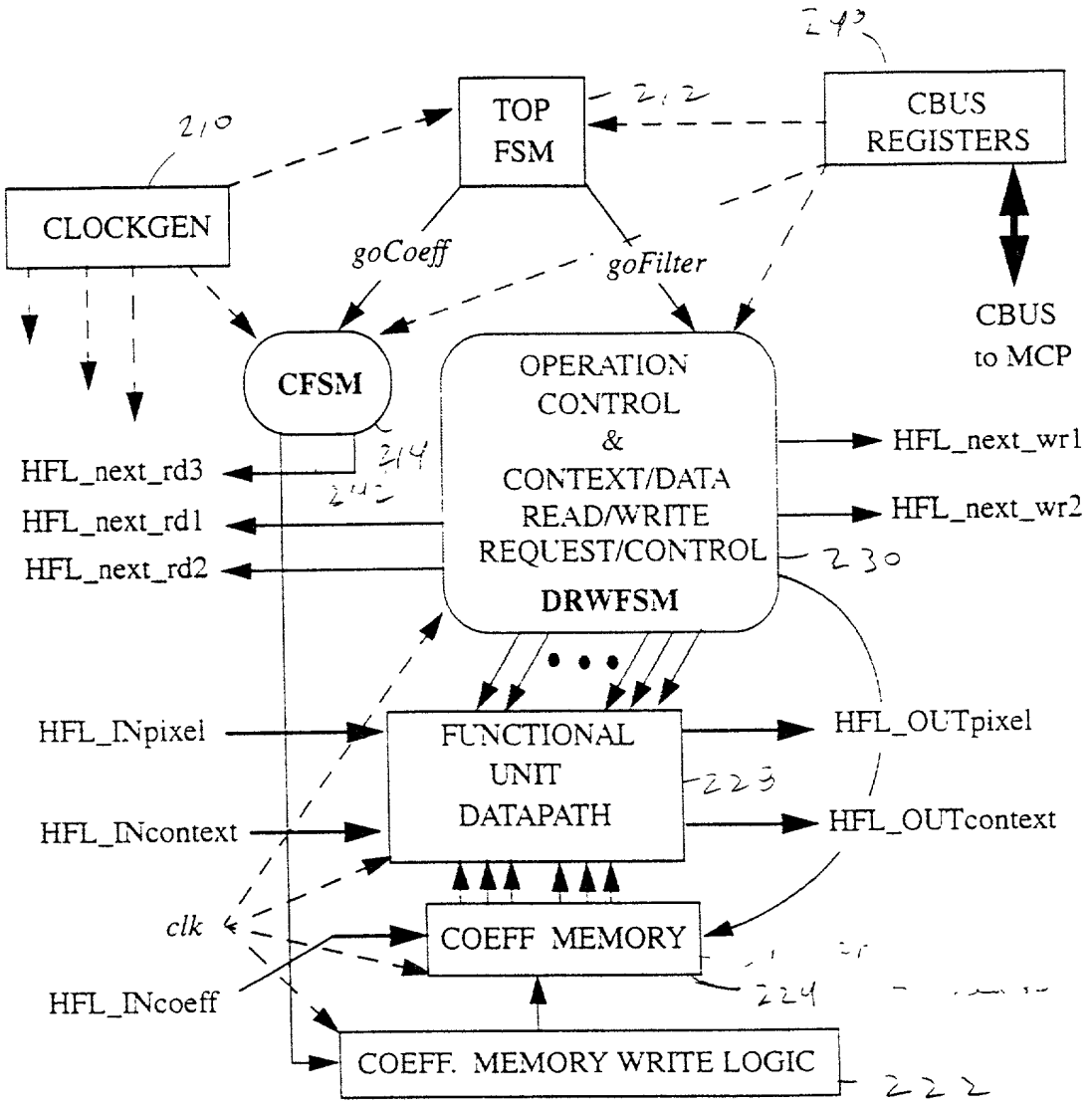

TOP FSM
CBUS REGISTERS
CLOCKGEN
goCoeff
goFilter
CBUS to MCP
CFSM
OPERATION CONTROL & CONTEXT/DATA READ/WRITE REQUEST/CONTROL
DRWFSM
HFL_next_rd3
HFL_next_rd1
HFL_next_rd2
HFL_next_wr1
HFL_next_wr2
HFL_INpixel
HFL_INcontext
FUNCTIONAL UNIT DATAPATH
HFL_OUTpixel
HFL_OUTcontext
clk
COEFF MEMORY
HFL_INcoeff
COEFF. MEMORY WRITE LOGIC
210
212
214
216
220
222
223
224
230
240

FIG 2

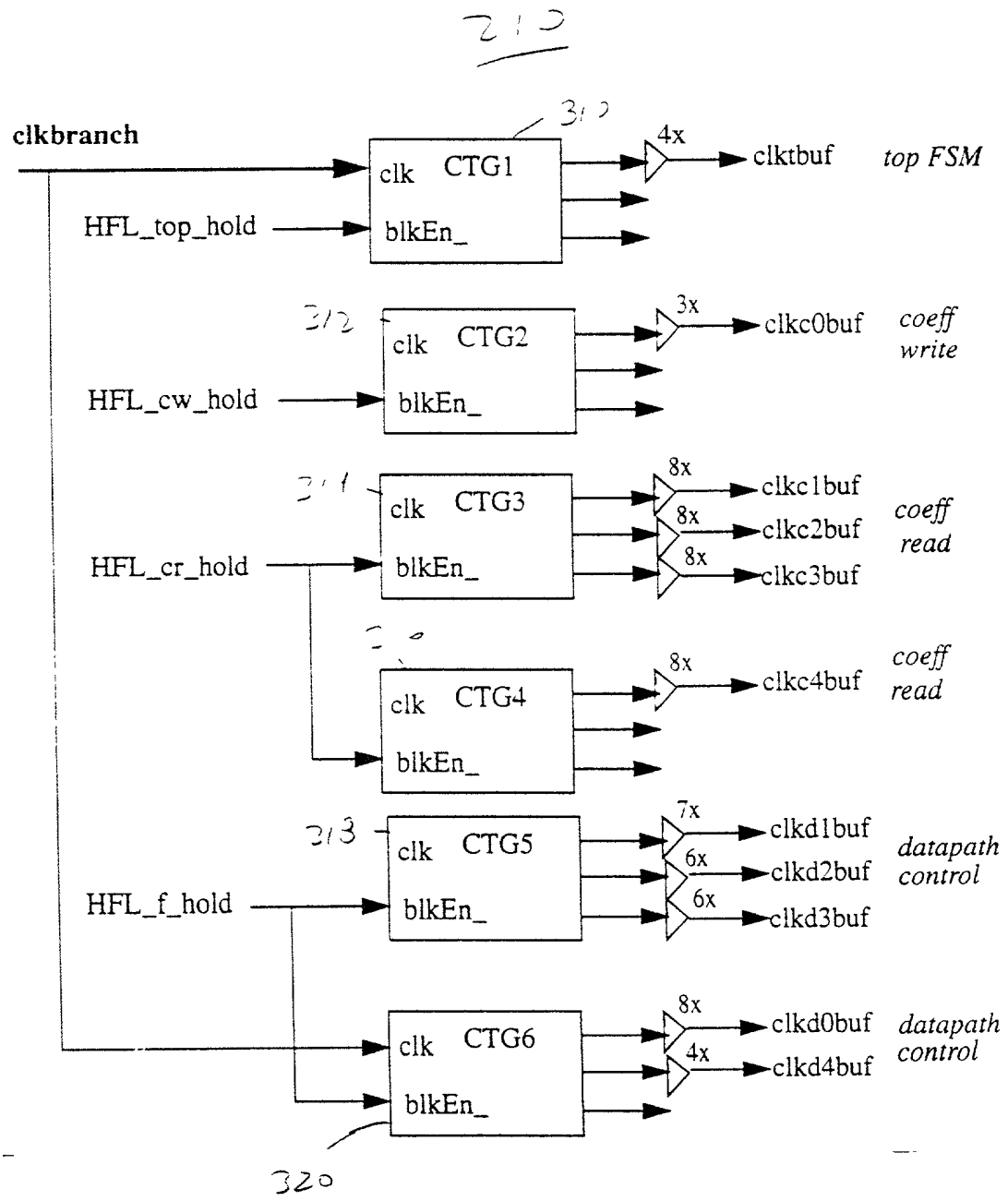
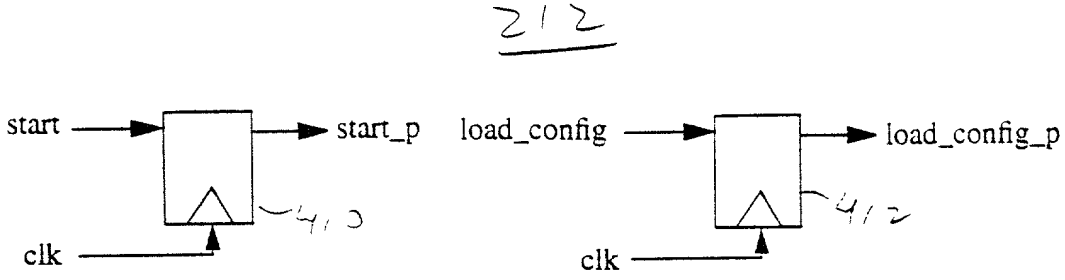
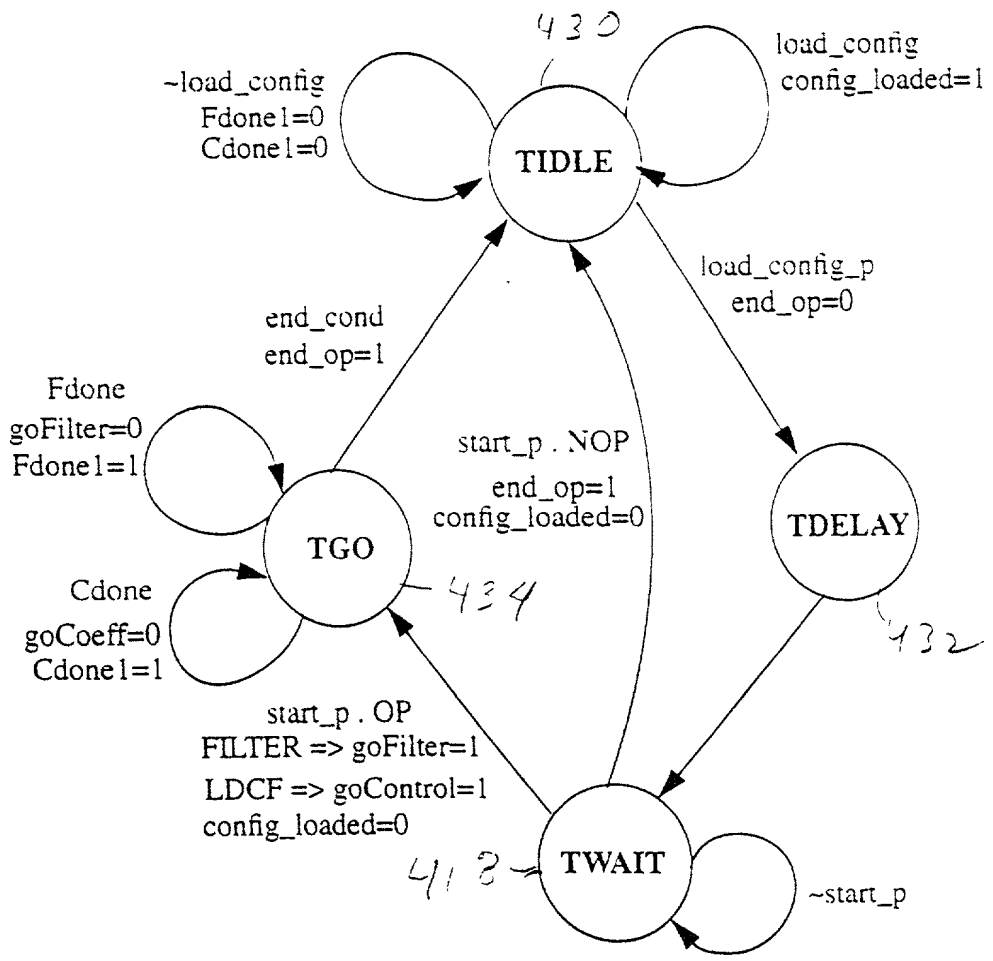

210
clkbranch
310
clk CTG1
blkEn_
HFL_top_hold
4x
clktbuf
top FSM
312
clk CTG2
blkEn_
HFL_cw_hold
3x
clkc0buf
coeff write
311
clk CTG3
blkEn_
HFL_cr_hold
8x
clkc1buf
8x
clkc2buf
8x
clkc3buf
coeff read
clk CTG4
blkEn_
8x
clkc4buf
coeff read
313
clk CTG5
blkEn_
HFL_f_hold
7x
clkd1buf
6x
clkd2buf
6x
clkd3buf
datapath control
clk CTG6
blkEn_
8x
clkd0buf
4x
clkd4buf
datapath control
320

FIG. 3

Fig. 4




```
end_cond= (FILTER && LDCF) ? (Fdone1 && Cdone1)
          : ((FILTER) ? Fdone1 . Cdone1
```



222

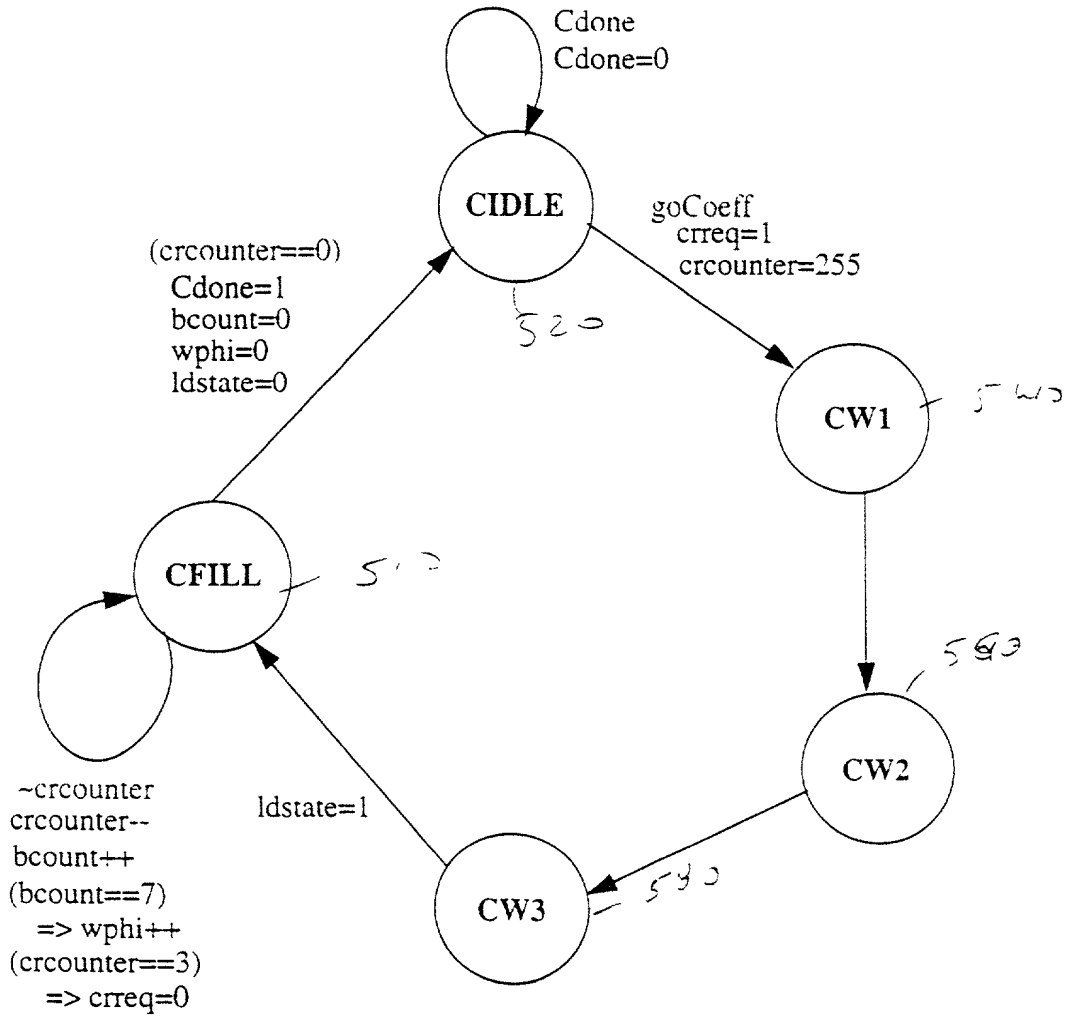

Cdone
Cdone=0
CIDLE
goCoeff
crreq=1
crcounter=255
(crcounter==0)
Cdone=1
bcount=0
wphi=0
ldstate=0
520
CW1
CFILL
CW2
CW3
~crcounter
crcounter--
bcount++
(bcount==7)
=> wphi++
(crcounter==3)
=> crreq=0
ldstate=1

FIG. 5

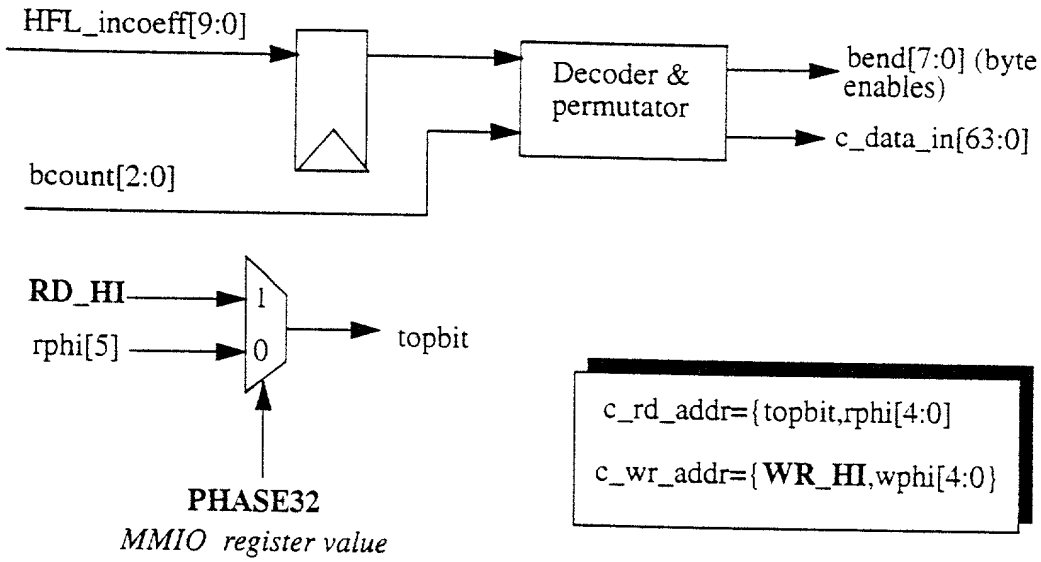

HFL_incoeff[9:0]
bcount[2:0]
Decoder &
permutator
bend[7:0] (byte
enables)
c_data_in[63:0]
RD_HI
rphi[5]
1
0
topbit
PHASE32
MMIO register value
c_rd_addr={topbit,rphi[4:0]
c_wr_addr={WR_HI,wphi[4:0}

FIG 6A

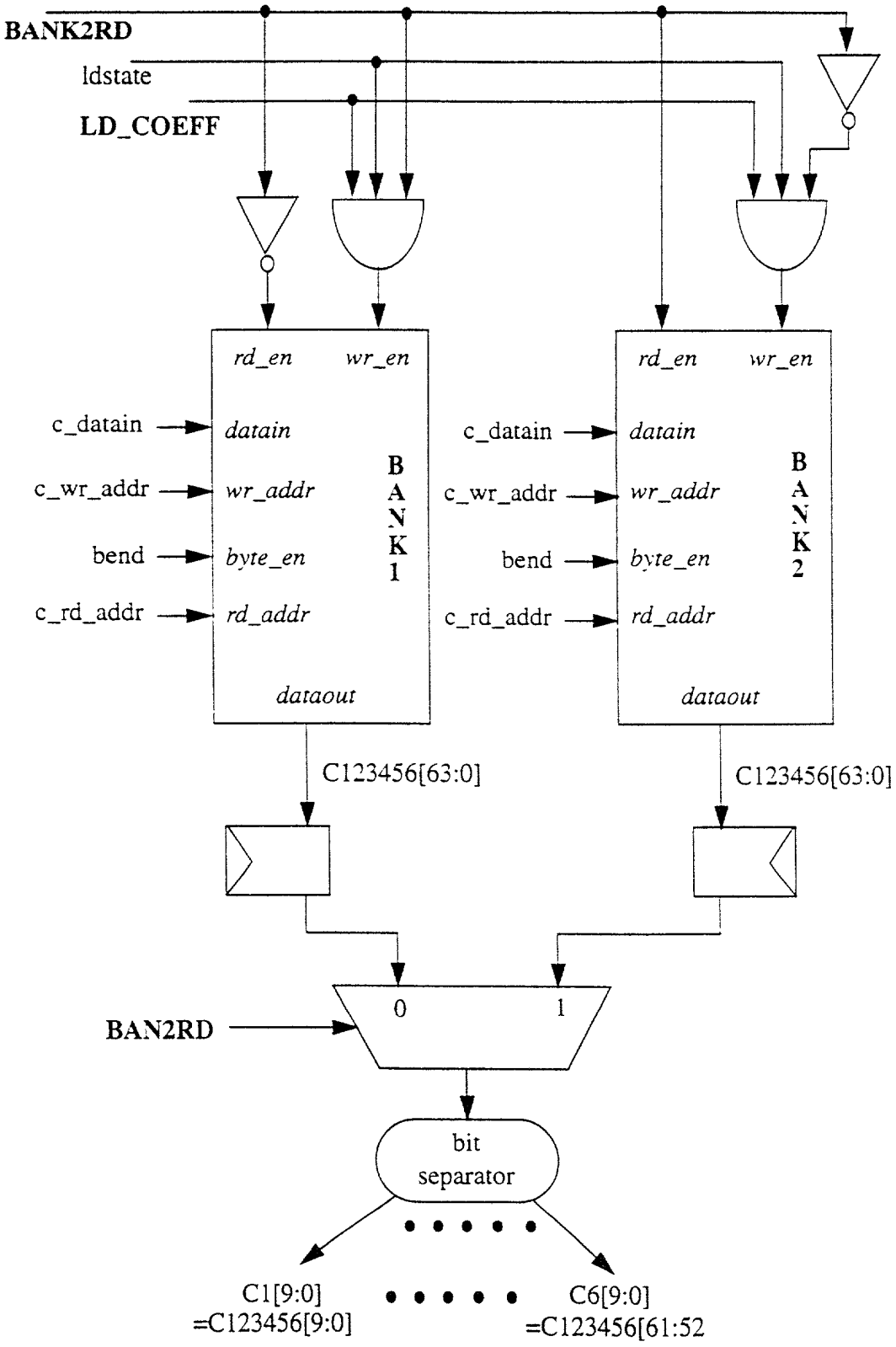
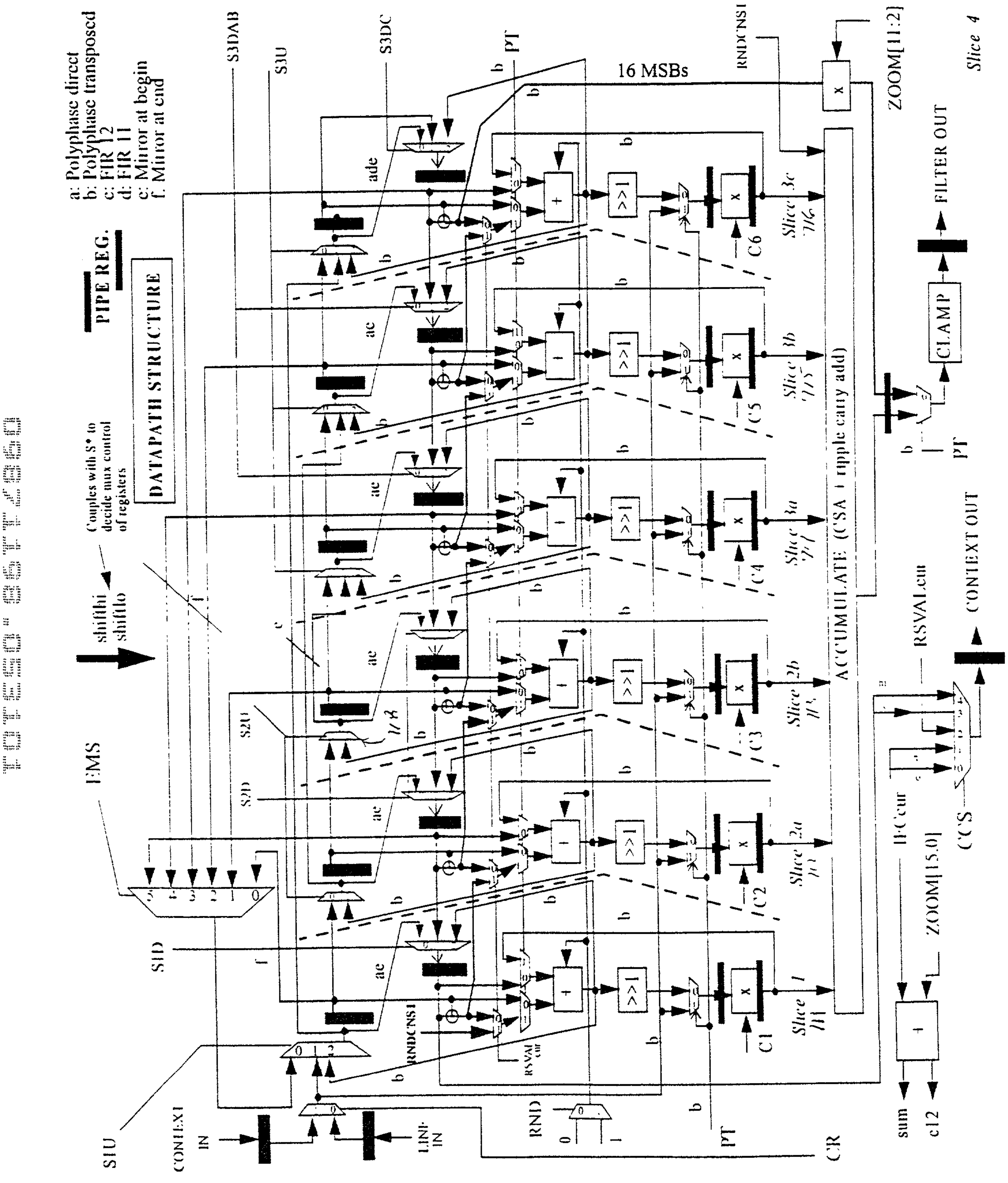

BANK2RD
ldstate
LD_COEFF
rd_en
wr_en
c_datain
datain
c_wr_addr
wr_addr
bend
byte_en
c_rd_addr
rd_addr
dataout
BANK1
BANK2
C123456[63:0]
BAN2RD
0
1
bit separator
C1[9:0] =C123456[9:0]
C6[9:0] =C123456[61:52

FIG. 6B



a: Polyphase direct
b: Polyphase transposed
c: FIR 12
d: FIR 11
e: Mirror at begin
f: Mirror at end
PIPE REG.
DATAPATH STRUCTURE
shifthi
shiftlo
Couples with S* to decide mux control of registers
EMS
S1U
S1D
S2D
S2U
S3U
S3DAB
S3DC
CONTEXT IN
LINE IN
RND
RNDCNST
RSVAL cur
CR
PT
16 MSBs
ZOOM[11:2]
ZOOM[15:0]
Slice 4
C1
C2
C3
C4
C5
C6
ACCUMULATE (CSA + ripple carry add)
CLAMP
FILTER OUT
CONTEXT OUT
RSVAL.cur
CCS
sum
c12

Fig. 7

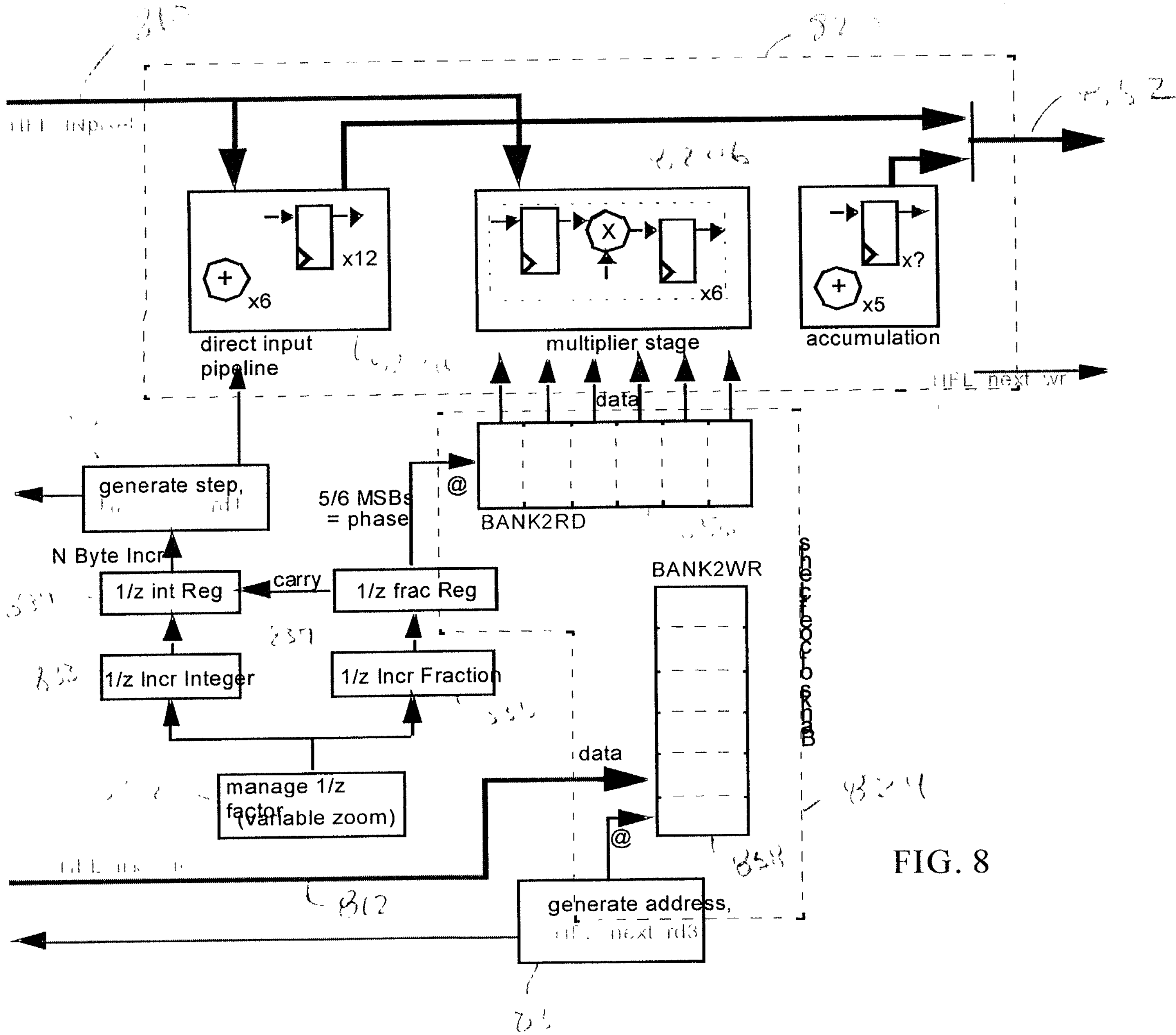

direct input pipeline
x6
x12
multiplier stage
x6
accumulation
x5
x?
data
BANK2RD
BANK2WR
5/6 MSBs = phase
@
generate step,
N Byte Incr
1/z int Reg
carry
1/z frac Reg
1/z Incr Integer
1/z Incr Fraction
manage 1/z factor (variable zoom)
data
@
generate address,

FIG. 8

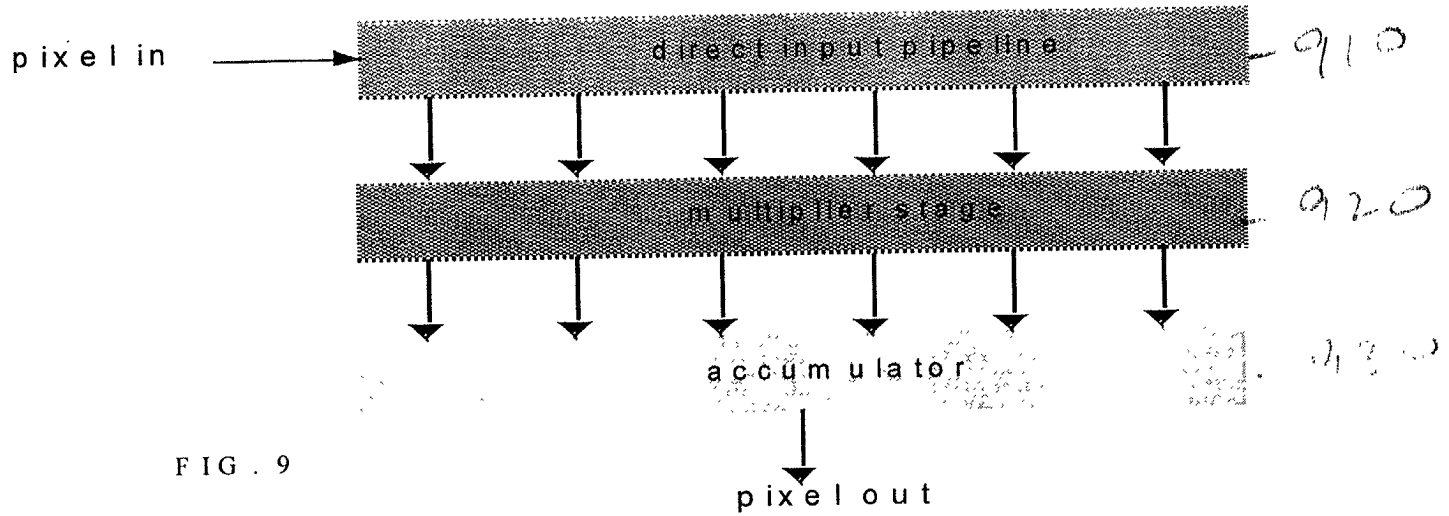
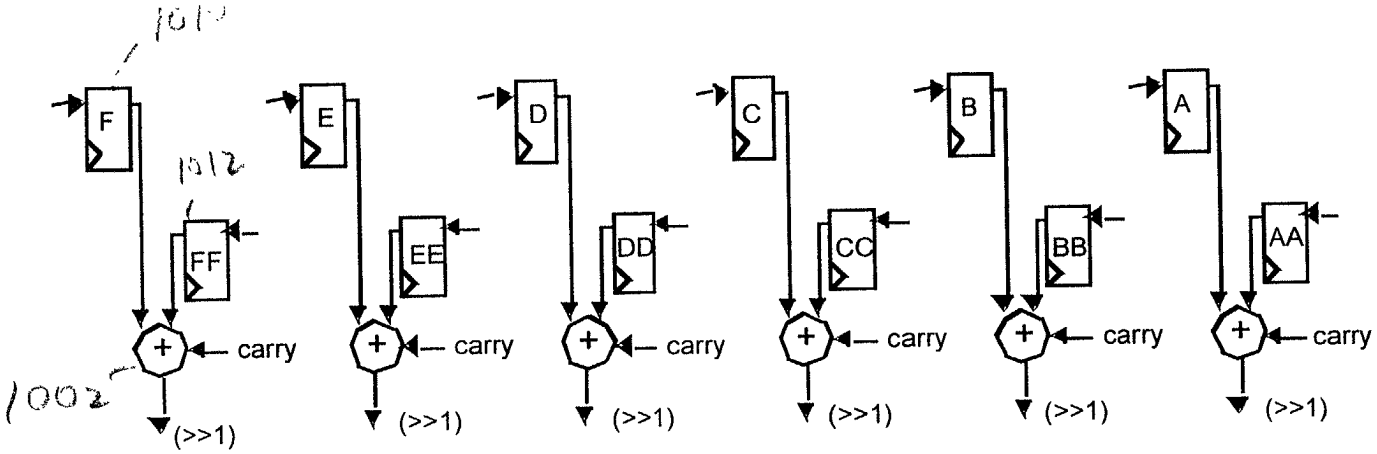


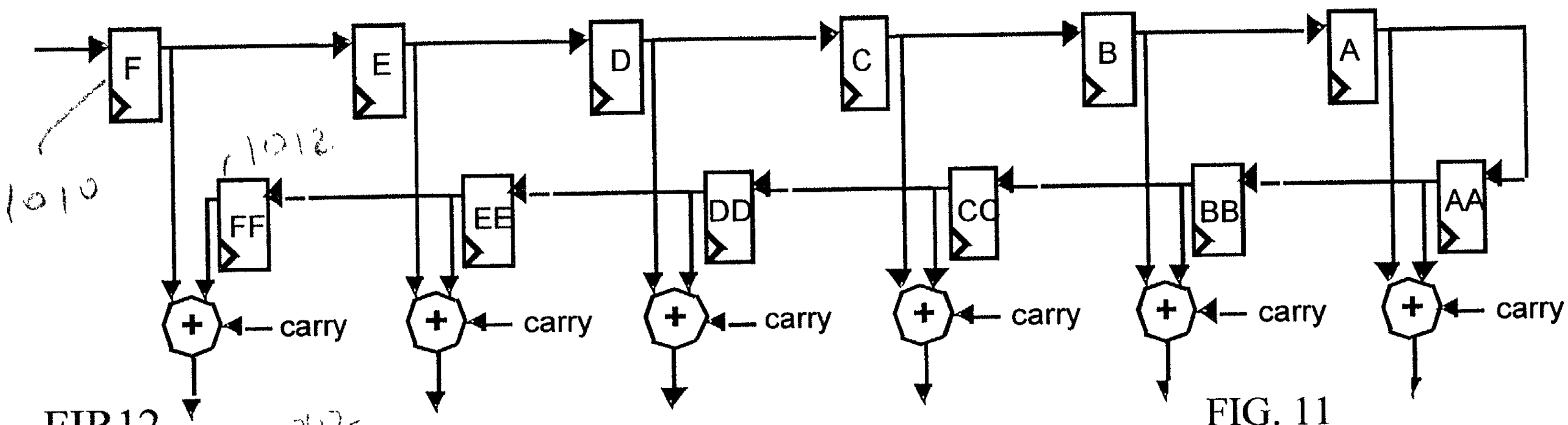
FIG. 9



Direct Input Pipeline

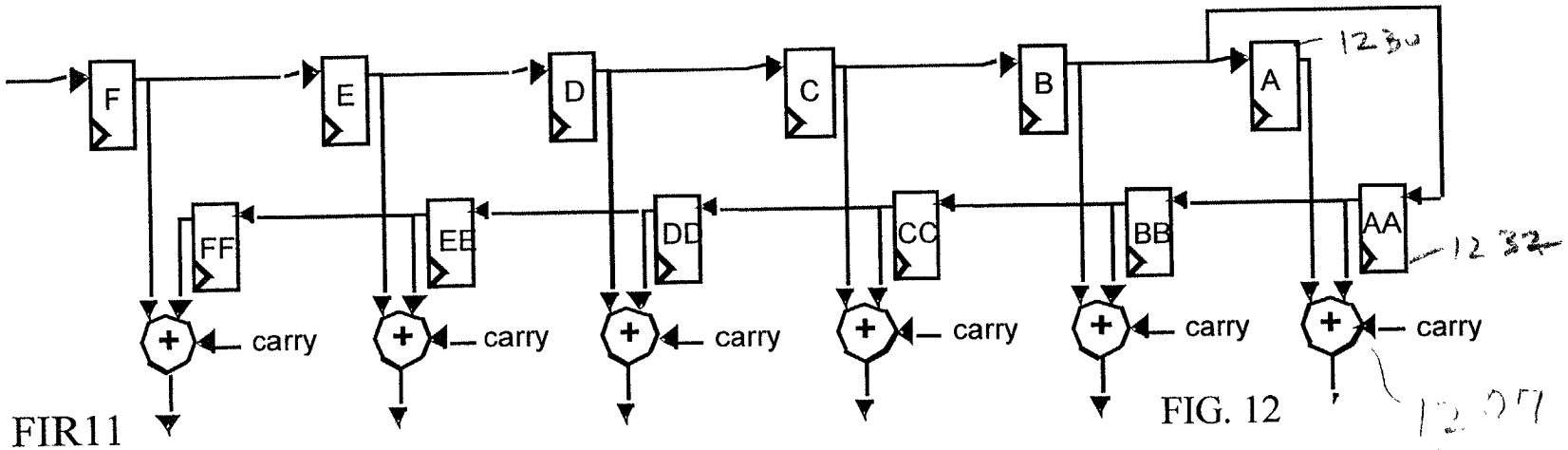
sent to the multiplier stage

FIG. 10


F
E
D
C
B
A
FF
EE
DD
CC
BB
AA
carry
carry
carry
carry
carry
carry
1010
1012

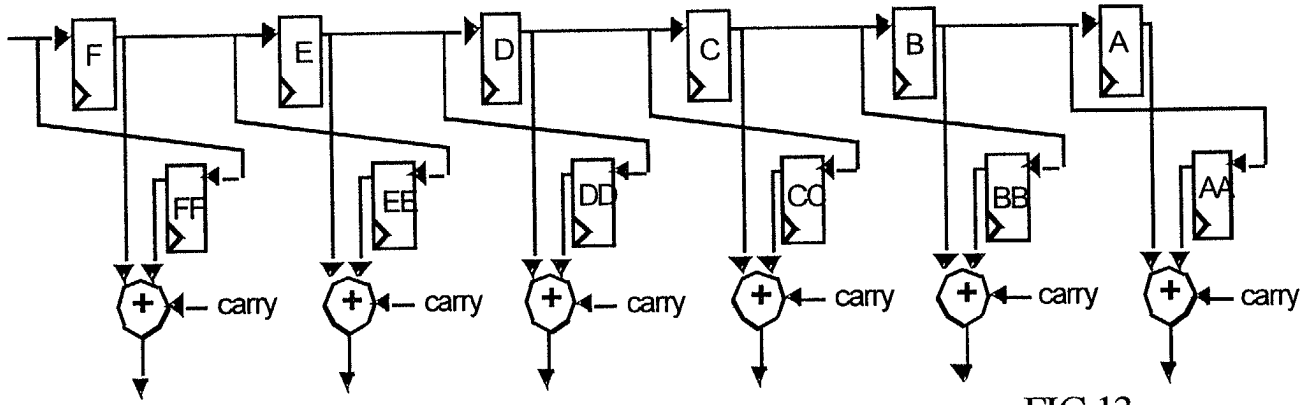
FIR12

FIG. 11



FIR11

FIG. 12



Polyphase

FIG.13

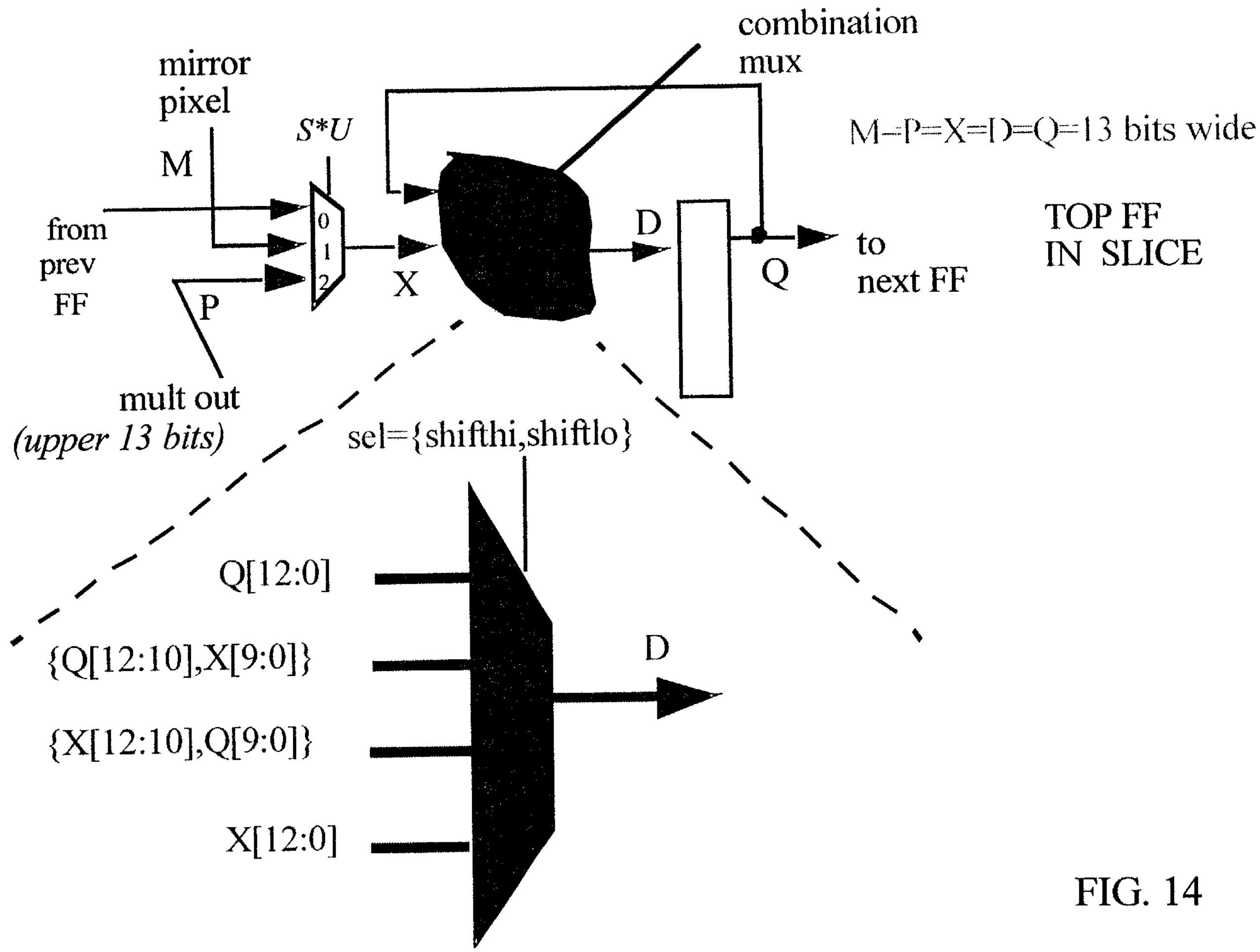

combination
mux
mirror
pixel
M
S*U
M=P=X=D=Q=13 bits wide
from
prev
FF
0
1
2
X
P
D
Q
to
next FF
TOP FF
IN SLICE
mult out
(upper 13 bits)
sel={shifthi,shiftlo}
Q[12:0]
{Q[12:10],X[9:0]}
{X[12:10],Q[9:0]}
X[12:0]
D

FIG. 14

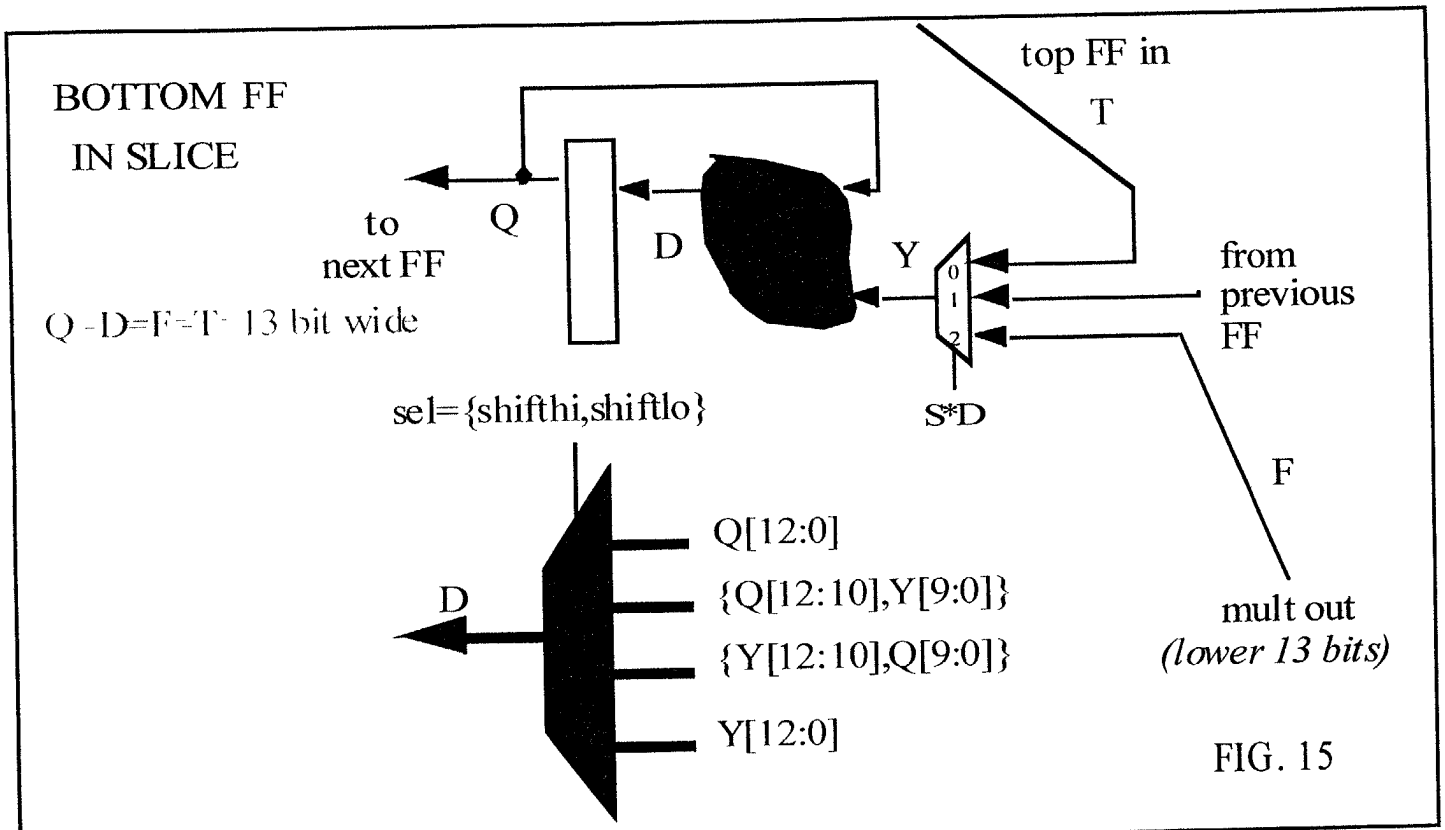

BOTTOM FF
IN SLICE
to
next FF
Q
D
top FF in
T
Y
from
previous
FF
0
1
2
S*D
F
mult out
(lower 13 bits)
sel={shifthi,shiftlo}
D
Q[12:0]
{Q[12:10],Y[9:0]}
{Y[12:10],Q[9:0]}
Y[12:0]

FIG. 15